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Abstract

In the presented paper we consider a coalition formation game with heterogeneous players, where a central issue is a problem of international cooperation towards pollution control. The main concern is to provide a better insight into asymmetric pattern and characterize size and structure of a stable agreement when abatement target is succeeded over a fixed and finite period of time.

For this purpose we suppose that all nations are allocated among K groups with respect to their welfare function. To define a voluntary membership of an international environmental agreement (IEA), we apply the concept of a self-enforcing coalition from oligopoly literature and determine equilibrium abatement commitments for each nation.

We have assumed that once a self-enforcing IEA emerges, signatories decide to perform the required emission reduction uniformly. As soon as the formed coalition initiates activities on emission decrease and the first results are observable, further agreement stability can be in danger. Withdrawal of some nations from the agreement and accessing of others would imply that the coalition will undergo structural change, which in its turn causes sequential switch to another abatement goal.

Presented analyses and examples reveal the following results. Self-enforcing IEA, which performs pollution decrease according to uniform scheme, that has been myopically picked up at the initial moment, is stable only over a certain part of the path. Once abatement has reached a threshold level, external stability fails and free-riders have incentives to access the agreement.

This occurs because the uniform pollution reduction scheme sets abatement targets, which differ from optimal ones both for IEA members and free-riders. To protect the coalition against free-riding, we shall continue with constructing a dynamic abatement scheme, which goes along with optimal choice and can depict agreement time-consistency

Abstract

We study a class of differential public good games and show how static public good games can naturally be embedded into this class. This allows us to compare the outcomes in the static and the dynamic case. In the dynamic case we study the feedback Nah-equilibria and compare these to the Nash equilibria of the corresponding static game. To solve for feedback the Nash equilibria in the dynamic case, we solve the Hamilton-Jacobi-Bellmann equation by using the method of characteristic functions. Analytical results are given.

Abstract

An optimal stopping time problem and multi-person stopping games with random horizon and players' priorities are considered. Players observe sequentially offers $Y_1, Y_2, ...$ at jump times $\tau_1, \tau_2, ...$ of a Poisson process. $Y_1, Y_2, ...$ are independent identically distributed random variables with common piecewise continuous known distribution function F. Each accepted offer Y_n results in a reward $X_n = g(Y_n r(\tau_n))$ if $\tau_n < M$, and 0 otherwise, where M is an independent random horizon, r is a non-increasing discount function and g is an utility function. If more than one player wants to accept an offer then the player with the highest priority (the lowest ordering) gets the reward. Optimal selection strategies are obtained on the basis of a general theorem showing that a model with random horizon may be reduced to a model with a modified discount function. The game is a generalization of the Elfving stopping time problem to the case with random horizon, and a modification of multi-person stopping games with priorities. Influence of stochastic and hazard rate orders on game values is analyzed. Application to a full information secretary type problem is given.

Abstract

Dynamic differential games have been widely applied to the timing of product and device innovations. Uncertainty is also inherent in the process of technological innovation: R&D expenditures will be engaged in an unforeseeable environment and possibly lead to innovations after a random time interval. J. F. Reinganum enumerates such uncertainties and risks: feasibility, delays in the process, imitation by rivals. Uncertainties generally affect the fundamentals of the standard differential game problem: discounted profit functional, differential state equations of the system, initial states. Two ways of resolution may be taken: firstly, stochastic differential games with Wiener process and secondly differential games with deterministic stages between random jumps (Poisson driven probabilities) of the modes. The player will then maximize the expected flows of his discounted profits subject to the stochastic state constraints of the system. In this context, the state evolution is described by a stochastic differential equation SDE (the Itô equation or the Kolmogorov forward equation KFE). According to the P. Dasgupta and J. Stiglitzs model, R&D efforts exert direct and induced influences (through accumulated knowledge) about the chances of success of innovations. The incentive to innovate and the R&D competition can be supplemented by a competition around a patent. This presentation is focused on such essential economic and managerial problems (R&D investments by firms, innovation process, and patent protection) with uncertainties using stochastic differential games, modeling with Itô SDEs and queueing models. The computations are carried out using the software MATHEMATICA 5.1 and other specialized packages.

Abstract

A Bayesian communication in the p-belief system is presented which leads to a Nash equilibrium of a strategic form game through messages as a Bayesian updating process. In the communication process each player predicts the other players' actions under his/her private information with probability at least his/her belief. The players communicate privately their conjectures through message according to the communication graph, where each player receiving the message learns and revises his/her conjecture. The emphasis is on that both any topological assumptions on the communication graph and any common-knowledge assumptions on the structure of communication are not required.

Abstract

The scheme of agencies represents the method of the coalitions formation, where the coalition can choose a leading player who becomes the authorized agent representing the interests of the whole coalition. As well as in the real world, these leading players can attract new players to maximize income of coalition. The game situation is modeled as that of a repeated game (as if the game is infinitely or indefinitely repeated with no "discounting") and we seek to find an equilibrium in that context. This equilibrium concept is quite similar to the concept of equilibrium under evolutionary pressures (or "natural selection"). Then we seek to find for the players, which are parties that have quite limited actual opportunities for bargaining and negotiative actions (because they have nothing like the full range of human verbal communications possibilities that they could use in the process of optimizing), a type of equilibrium such that each of the game parties is not capable of making any refinement of his/her strategic behavior pattern that would improve his/her payoff expectations prospect. The work presents an exhaustive experiment on the behavior of specialized robot players that are designed to effectively bargain or negotiate for obtaining favorable outcomes in terms of "the division of the spoils" as regards the payoffs realized from the cooperative game.

Abstract

In this paper the problem of allocation over time of total cost incurred by coalitions of countries in a coalitional game of pollution reduction is considered. The Nash equilibrium in the game played by coalitions is computed and then the value of each coalition is allocated according to some given mechanism between its members. Mechanism for allocation over time of total individual costs so that the initial agreement remains valid for the whole duration of the game is proposed. This guarantees the time consistency of solution which means that if one renegotiates the agreement at any intermediate instant of time assumed that the coalitional solution has prevailed from initial date till that instant, then one would obtain the same outcome.

Abstract

The paper adapts a game theoretic approach to the dynamics of argumentation. It was shown that two sorts of connections exists: the link between the dynamic of argumentation and propositional logic and the link between propositional logic and games of deterrence, through the graphs of deterrence associated with these games. Thereby we focus on a multi-layer approach that bridges the fields of systems dynamics, propositional logic, and games of deterrence. More precisely, we consider the development of an argumentation as a dynamic system, and to that end propose an interpretation of a dynamic system in the framework of argumentation. In the previous research the Games of Deterrence and the deterrence approach on the graph have been already explored, so here we shall establish a second one-to-one mapping to give an interpretation of a system of logical propositions as a game of deterrence, which solutions will define the truth value of the propositions under consideration. It will thus enable to model a process of argumentation as a game of deterrence, in which the playability properties of a strategy will determine the validity of an argument.

Abstract

An optimal stopping problem belonging to 3-player 2-ehoice n-stage sequential game is studied. A three-player committee is looking for a specialist with two kinds of high abilities. There are n applicants. The committee interviews each applicant one-by-one and it decides it's R(=reject) or A(=accept) by simple majority over each member's choice of R/A. Payoff to each player is the minimum of the two kinds of abilities of the applicant accepted by the committee. The solution without using computer is given.

Abstract

In the paper, a game-theoretical analysis of some stable outcomes in pure exchange economies is given. We deal, mostly, with an equilibrium characterization of unblocked allocations generated by recontracting process close to that introduced by V.L.Makarov (1980). Rather mild assumptions, providing coincidence of the corresponding contractual core and the set of Walrasian equilibrium allocations, are established, and two examples, demonstrating relevance of the main assumptions, are proposed.

Abstract

The paper considers differential game in which there is a possibility of cooperation among players. It is assumed that players cooperate in a grand coalition and maximize their total payoff. The time consistency of the cooperative optimality principle is verified. In the case of time inconsistency of optimality principle the procedure of re-distribution of the players' payoffs along the cooperative trajectory to achieve time consistency is proposed. The multicriteria control problem is defined by the system of differential equations. Pareto optimality is considered as solution concept in this class of problems. The numerical examples represent theoretical results.